

ABSTRACT OF THE DISCLOSURE

One embodiment of the present invention provides a fuel cell, which includes an electrolyte comprising at least one proton conductor; a fuel electrode provided on a first side of the electrolyte; an oxidant electrode provided on a second side of the electrolyte; at least one internal electrode provided in the electrolyte; and an electric voltage application means provided either between the internal electrode and the fuel electrode or between the internal electrode and the oxidant electrode. Other embodiments include methods of making and using and controlling the fuel cell.